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# THE PRE-COLUMBIAN OCCURRENCE OF LAGENARIA SEEDS IN COASTAL PERU


BY

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IN the light of the recent discussion by Dr. Thomas W. Whitaker (Whitaker & Bird, 1949) of the seeds of gourds (*Lagenaria siceraria*) recovered at Huaca Prieta on the coast of Peru, the results of a study of gourd seeds found at four other archaeological sites on this coast are of special interest.

The site of Huaca Prieta is located on the north coast of Peru not far from the mouth of the Chicama River. It consists of a large midden and a smaller midden slightly to the north of the larger. Both of these were examined by Mr. Junius B. Bird in 1946–47 and described by him in his preliminary reports (Bird, 1948). The exploration of the site proved that the larger mound and the lower levels of the smaller mound represent an early primitive culture which Bird designates as "Early Farmers" or "Preceramic agriculture." The time limits of this horizon are approximately 3000–1200 B.C. according to radiocarbon dating (Bird, 1951). The economy of these people was based partly upon fishing, and partly upon agriculture. Although remains of maize were lacking, specimens of a number of other plants were recovered. Some of these, such as the cat-tail, were native to the area and grew wild, while others, like the cucurbits, in all probability were cultivated.

A later culture known as Cupisnique appeared in the upper levels of the smaller midden. An early type of pottery and small cobs of maize were among the cultural innovations found in these levels. This evidence suggests that a group of people had migrated into the area from another region.

One of the plants most frequently found in both the Preceramic and Cupisnique levels was the common gourd, *Lagenaria siceraria*. Its occurrence was more marked in the older period, the recovered specimens consisting of gourd artifacts, shell fragments, peduncles and seeds. These categories were also represented in the later period, but the specimens, though still abundant, were fewer in number. Selected samples of the cucurbit materials recovered by Bird were submitted to Whitaker for study. These samples consisted of specimens of both Lagenaria and Cucurbita and are described in his report.

From the specimens found in the lower or Preceramic levels, Whitaker isolated two types of Lagenaria seeds. One type was disassociated from the fruits; the other was still contained in a bottle gourd that had been used as a net float. The first group of seeds is characterized by large size, parallel longitudinal lines and the presence of a winged protuberance at either side of the broad end of the seed. The measurements of these large seeds are not given, but a fair approximation may be obtained by comparison with the mm. scale at the bottom of the photograph in which the seeds are pictured (Whitaker & Bird, 1949, fig. 3 D). The average maximum length of the six specimens shown is 17 mm.; the average maximum width 9 mm. Whitaker states that these large, broad seeds with their paired winged protuberances are similar to modern Lagenaria seeds from the Old World. Furthermore, he notes that they are in marked contrast to the typical gourd seeds found in other archaeological collec-

tions from South America which are said to be smaller in size, slender and often lacking the paired winged protuberances.

This smaller type was represented in the lower levels at Huaca Prieta by seeds recovered from a net float and illustrated by Whitaker (loc. cit., fig. 3 C). These seeds have an average maximum length of 13 mm.; an average maximum width of 6 mm.; in two cases they appear to have a suggestion of a winged protuberance. In addition to this group of specimens, others of the same type were recovered from the later or Cupisnique levels.

To summarize the occurrence of these two types of Lagenaria seeds at Huaca Prieta: the first or large, broad type appeared only in the Preceramic horizon; the second or small type was recovered in both the Preceramic and the Cupisnique levels.

Through the generosity of Dr. William Duncan Strong of Columbia University I have been privileged to study the ethnobotanical collections from several other archaeological sites on the coast of Peru. I wish also to express at this time my appreciation to various members of the Botanical Museum and the staff of the Biological Laboratories of Harvard University for their generous advice and assistance given me during the course of this study.

Among the plant remains in these Peruvian collections are seeds, peduncles and shells, both whole and broken, of *Lagenaria siceraria*. Descriptions of the seeds of this plant from four sites will be given below. However, it seems advisable at the outset to describe briefly the general structure of Lagenaria seeds.

The seeds of Lagenaria vary in shape and general appearance, depending upon the type of fruit; they are usually more or less tapering. The hilum, the point of attachment of the seed to the fruit, is at the narrower end. The seed coat or testa comprises three types of tis-

sue. The outer layer or epidermis consists of long, slender, parallel cells. These cells are easily damaged and only a few scattered broken cells of this layer may be found. The cells that constitute the second portion of the testa form a soft, spongy layer. The ones that comprise the inner part are more compact and furnish a hard, firm protective layer for the embryo.

Among the external characteristics that Lagenaria seeds may possess are longitudinal ridges, and paired winged protuberances at either side of the end of the seed opposite the hilum. These are surface outgrowths of the testa and are formed of the cell tissue of the outer layers of the seed coat. Because of the spongy nature of this tissue these structures may disappear in time through erosion, as may part of the outer layer itself, leaving merely a narrow strip of spongy tissue or possibly only the hard inner layer of the testa.

The archaeological sites from which the Lagenaria seeds were obtained are Aspero, Huaca de la Cruez, Pachacamac and Castillo de Tomaval. Two of these sites, Aspero and Pachacamac, are located on the central coast of Peru. The other two, Huaca de la Cruez and Castillo de Tomaval, are located in the Viru Valley on the north coast of Peru south of the site of Huaca Prieta.

The Aspero site is located near Puerto de Supe. It was excavated by Strong and Willey in 1941–42 (Strong, 1943). Among the plant remains recovered is a whole oblong gourd (747/41A), with the wall crushed at one point. This presumably occurred after it was placed in the burial in which it was found. The gourd contained 288 seeds some of which were still attached to the shell wall when examined. All of these seeds show evidence of erosion, although in varying degrees. Samples of groups of these seeds based upon the degree of erosion are shown in Plate LVII.

Of the 288 seeds, 117, or approximately 40 percent, are well preserved (Plate LVII, A). The outer surface of the specimens is only slightly eroded and the parallel longitudinal lines and paired winged protuberances are clearly seen. The average maximum length is 14 mm.; the average maximum width 8 mm. These seeds are a light brown color. There are 137 seeds, approximately 48 percent of the total, which show intermediate degrees of erosion (Plate LVII, B). All of the specimens in this group show a marked degree of erosion, in some cases the wings of the seeds having completely disappeared. However, the parallel lines and the ridge on the edge of the seed can still be detected. Finally, there is a third group of seeds which shows the greatest evidence of erosion with neither parallel lines nor wings remaining (Plate LVII, C). There are 34 seeds, or 12 percent of the total, in this group. The average maximum length of these specimens is 14 mm.; the average maximum width 7 mm. The similarity between the average maximum length of the best and most poorly preserved seeds can be explained by the fact that in both groups the characteristic points at the center of either end of the seed are part of the harder inner layer of the seed coat. They are thus more resistant to erosion than those parts of the testa that comprise the softer outer layer. In these two groups of specimens these points were used in the majority of cases in obtaining the maximum seed length, since the wings did not extend below the point at the center of the broad end of the seed.

The well preserved seeds of this gourd from Aspero resemble the large, broad, winged seeds from the Preceramic levels at Huaca Prieta described by Whitaker, although their average maximum measurements lie between the measurements of his two categories. The slender, eroded seeds from the same gourd might easily be

mistaken for seeds of the second or smaller type found at Huaca Prieta, as a comparison of Plate LVII, C with Whitaker's fig. 3C clearly reveals. Yet the variation in the seeds of the Aspero gourd, all contained in a single fruit, is strictly the product of differences in the degree of erosion.

The early Ancon-Supe period of the central coast, to which the Aspero site belongs, is contemporaneous with the Cupisnique period of the north coast. Although the large, winged gourd seeds were not recovered from the Cupisnique levels at Huaca Prieta, gourd plants producing seeds of this kind were existing at that time at Aspero to the south.

At Huaca de la Cruez in the Viru Valley Strong discovered 88 seeds (3/V-162) and some shell fragments of Lagenaria in a burial of the Mochica period. The seeds were together in one lot. Although not actually associated in the collection with the parent fruit, which in all probability became broken after burial, the shell fragments and seeds may have been parts of a single fruit.

All of these seeds from Huaca de la Cruez show evidence of erosion. Seventeen specimens, or 27 percent of the entire group, are fairly well preserved; 37 specimens, or 45 percent, show marked erosion; while 27 seeds, or 33 percent, have lost practically all of the outer layer of the seed coat. A series of these specimens showing progressive degrees of erosion are illustrated in Plate LVIII.

The seventeen best preserved specimens (Plate LVIII, A) have an average maximum length of 18 mm. and an average maximum width of 10–10.5 mm. The parallel longitudinal lines and the paired wings are distinct. The color of the seeds is generally a light brown. A few, however, have an occasional black marking due to discoloration from the grave content.

The 27 specimens showing the greatest degree of ero-

sion (Plate LVIII, C) have lost the parallel lines and the paired protuberances. A thin layer of the softer outer surface of the testa alone remains. These seeds have an average maximum length of 16 mm. and an average maximum width of 8 mm. Compared to the measurements of the best preserved group of seeds, they are 2 mm. shorter in the average maximum length and 1.5–2 mm. narrower in the average maximum width. The color of this group of seeds is either black or brown mottled with black. Attached to the surface of several seeds are fragments of carbonized material. These seeds, like those from Aspero, could, if found separately from the better preserved ones, be classified as belonging to the slender type of Lagenaria seed found at Huaca Prieta. However, when the entire series is considered, all the Lagenaria seeds found at Huaca de la Cruez, as at Aspero, must be referred to the large, broad type found in Preceramic levels at Huaca Prieta.

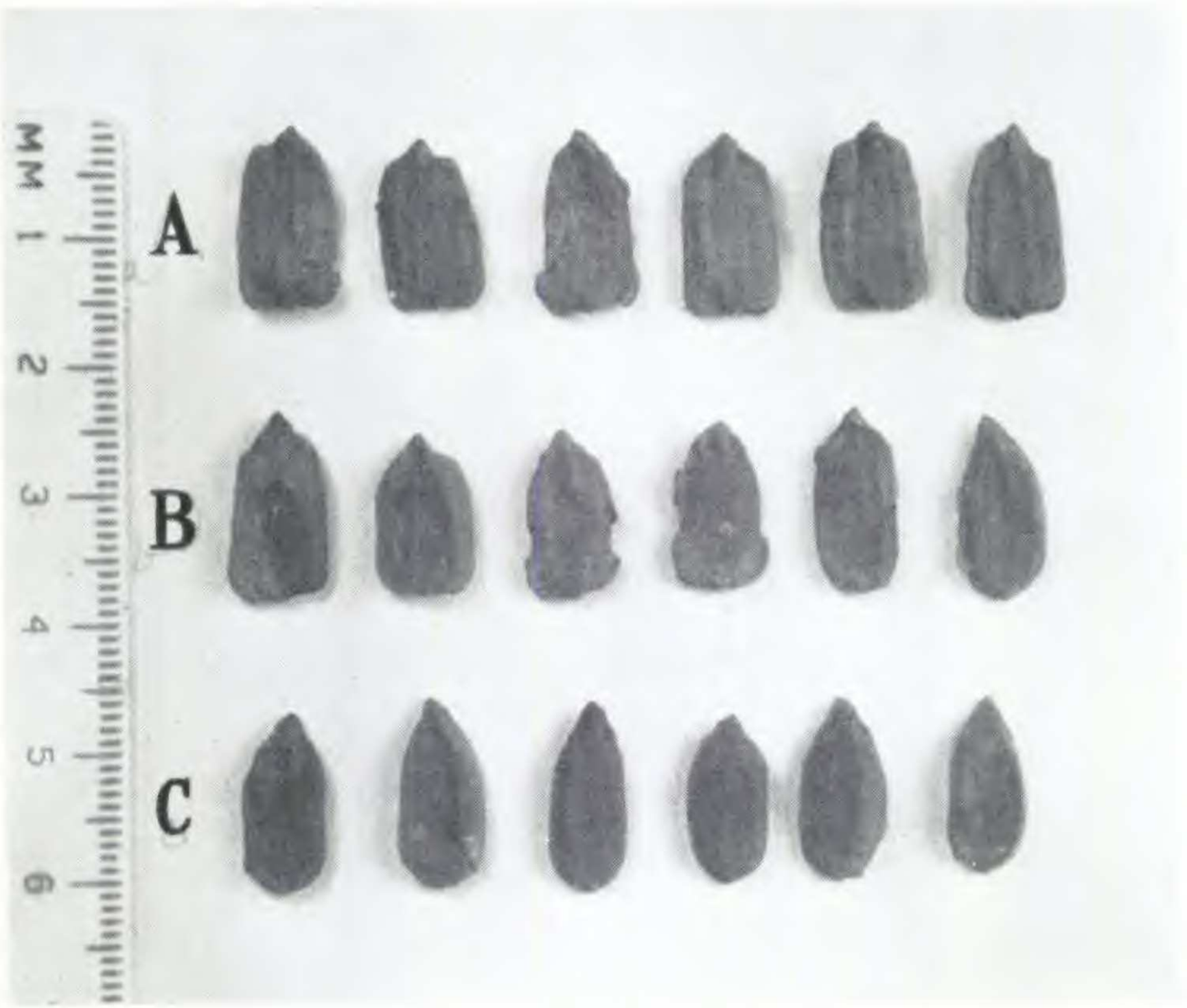
A second site on the central coast in which seeds of Lagenaria were recovered is Pachacamac. This large and important site lies in the Lurin Valley 30 kilometers from the present city of Lima. The extensive area covered by the ruins of the ancient city of Pachacamac includes the remains of the Temple of the Sun and the Temple of Pachacamac. This site has been the object of much exploration and study, one of the most recent of which has been the excavations of Strong, Willey and Corbet in 1942 (Strong, 1943). They concentrated the major portion of their work upon the large midden to the south of the main entrance to the Temple of the Sun. Two cuts were made from the outer edge of the debris to the temple wall, in an endeavor to study whatever cultural sequence existed.

Among the wide variety of plant remains recovered were numerous specimens of Lagenaria. There were two

## EXPLANATION OF THE ILLUSTRATION

PLATE LVII. Seeds of Lagenaria from a single gourd recovered at Aspero showing varying degrees of erosion. A, best preserved. B, intermediate. C, most poorly preserved.

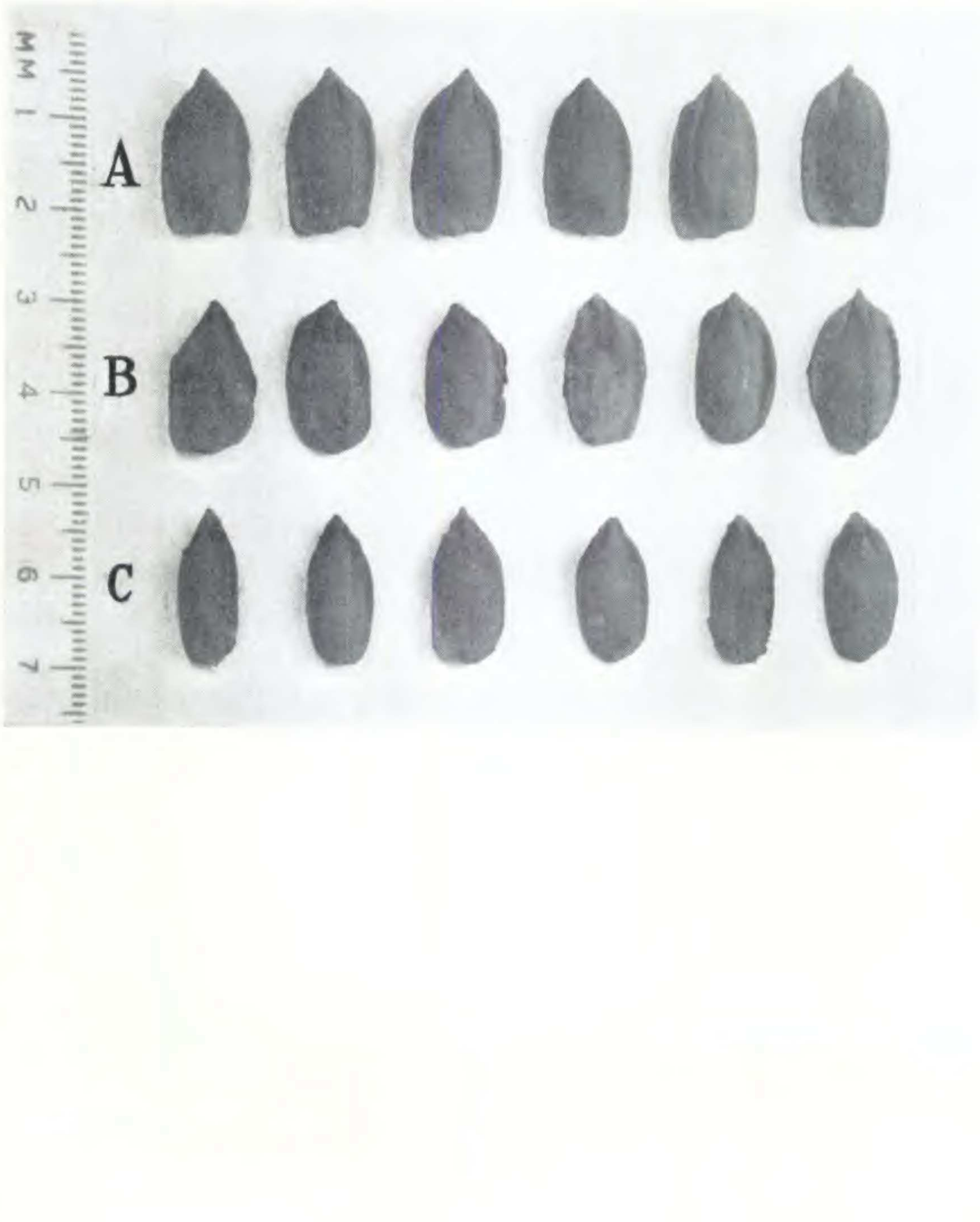
# Plate LVII



## EXPLANATION OF THE ILLUSTRATION

PLATE LVIII. Seeds of Lagenaria from a burial at Huaca de la Cruez showing the effect of erosion. A, well preserved. B, showing marked weathering. C, strongly eroded.

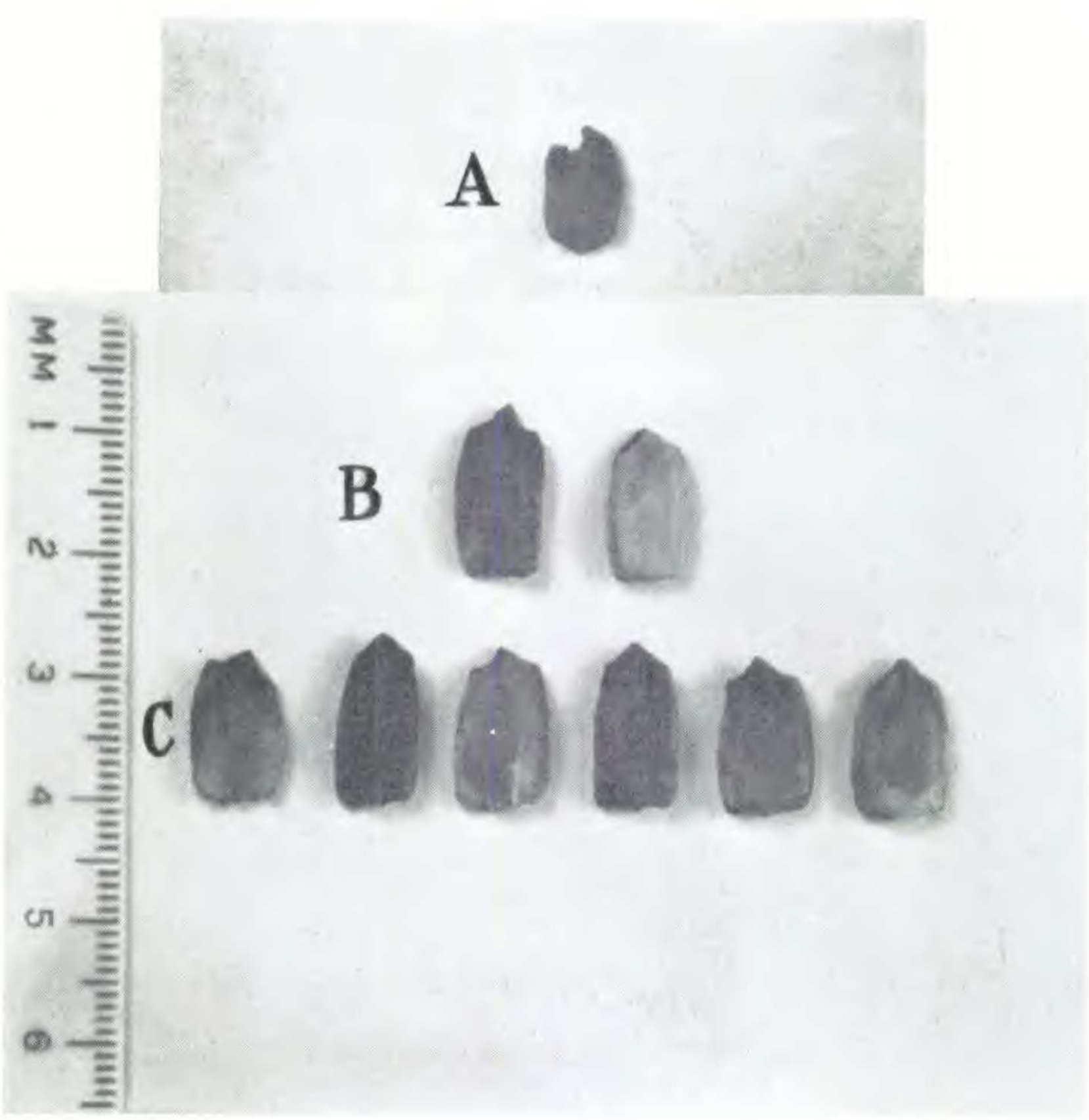
# Plate LVIII



## EXPLANATION OF THE ILLUSTRATION

PLATE LIX. Lagenaria seeds recovered from Castillo de Tomaval and Pachacamac. A, eroded seed of *Lagenaria siceraria* recovered from Castillo de Tomaval. B, two seeds from specimen 135/41A from Pachacamac. C, group of seeds from specimen G 81 from Pachacamac.

# Plate LIX



shell fragments of this fruit to which seeds still clung along the inner shell wall. One specimen (135/41A) accompanied by two seeds (Plate LIX, B) comprises the flower end of a gourd fruit. The average maximum length of these seeds is 14 mm.; the average maximum width 7.5 mm. Both show some erosion of the outer seed coat, but the longitudinal lines and the paired wings are still distinct. One of the seeds is a cream color; the other a dark brown. This gourd shell was removed from a stratum showing Inca influence.

The stem end of another Lagenaria fruit (G 81) was recovered from the general digging in this refuse heap. Ten seeds were attached to the inner shell wall. These have an average maximum length of 14 mm.; and an average maximum width of 8 mm. All of these seeds retain the outer layer of the seed coat, although in a few specimens the parallel lines and paired wings have been partially worn away. Six of the seeds are a deep cream color while four are dark brown. A series of these seeds is shown in Plate LIX, C. It is not possible to give the exact cultural period to which this material belongs, since it came from the general digging. However, judging from the distribution of specimens of pottery found in this portion of the midden, it is reasonable to assume that it belonged to either an Inca-associated or Inca level.

The remaining site, Castillo de Tomaval, is in the Viru Valley on the north coast of Peru. Only one seed (21/V-51) of Lagenaria occurred in the collection of gourd remains from this site. This is a small, worn, partly-broken seed (Plate LIX, A) with a maximum length of 11 mm. and a maximum width of 7 mm. The outer layer of the seed coat is represented merely by a thin, uneven layer of spongy tissue with only a suggestion of the parallel longitudinal lines. The point at the center of the broad end of the seed is distinct, but only